

# Curriculum Vitae

## Xusheng Luo

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### RESEARCH INTERESTS

Robotics; Cyber-Physical Systems; Task and Motion Planning; Formal Methods and Control Synthesis

### CURRENT POSITION

Autonomous driving research engineer at DJI Software Technology Co., Ltd.

### EDUCATION

#### Ph.D. in Mechanical Engineering (Robotics Track)

*Duke University*, Durham, NC, U.S.

Aug. 2017 - Dec. 2020

- Dissertation: *Scalable Control Synthesis for Multi-Robot Systems under Temporal Logic Specifications*
- Advisor: Michael M. Zavlanos
- Relevant Coursework: *Machine Learning, Artificial Intelligence, Dynamic Programming & Optimal Control, Numerical Methods for Nonlinear Optimization, Program, Data Structure & Algorithm in C++, Intro to Model Predictive Control, Linear System Theory, Intro to Mathematical Statistics, Probability.*

#### M.Sc. in Mechanical Engineering (Robotics Track)

*Duke University*, Durham, NC, U.S.

Aug. 2017 - May. 2020

- Advisor: Michael M. Zavlanos

#### M.Sc. in Aeronautical and Astronautical Science and Technology

*Harbin Institute of Technology*, Harbin, China

Sep. 2015 - July 2017

- Thesis: *Key Techniques of Multi-Source Information Fusion in Integrated Navigation System*
- Advisor: Wuxing Jing

#### B.Sc. in Flight Vehicle Design and Engineering

*Harbin Institute of Technology*, Harbin, China

Aug. 2011 - July. 2015

- Thesis: *Autonomous Navigation for Mars Probe Using Celestial Objects and Landmarks*
- Advisor: Wuxing Jing

### PUBLICATIONS Journal Articles

- J1. **X. Luo** and M. M. Zavlanos, "Temporal Logic Task Allocation and Motion Planning in Multi-Robot Systems", *IEEE Transaction on Robotics*, March 2021 (under review).
- J2. **X. Luo**, Y. Kantaros, and M. M. Zavlanos, "An Abstraction-Free Method for Multi-Robot Temporal Logic Optimal Control Synthesis", *IEEE Transactions on Robotics*, January, 2021.
- J3. **X. Luo**, M. Pajic, and M. M. Zavlanos, "An Optimal Graph-Search Method for Secure State Estimation", *Automatica*, September, 2020.

### Conference Proceedings

- C1. S. Sun, Y. Zhang, **X. Luo**, P. Vlantis, M. Pajic, and M. M. Zavlanos, “Formal Verification of Stochastic Systems with ReLU Neural Network Controller”, Robotics: Science and Systems, 2021 (under review).
- C2. **X. Luo\***, Y. Zhang\*, and M. M. Zavlanos, “Socially-Aware Robot Planning via Bandit Human Feedback”, ACM/IEEE 11th International Conference on Cyber-Physical Systems (ICCPS), Sydney, Australia, April, 2020, pp. 216-225.
- C3. D. M. Le, **X. Luo**, L. J. Bridgeman, M. M. Zavlanos, and W. E. Dixon, “Single-Agent Indirect Herding of Multiple Targets using Metric Temporal Logic Switching”, IEEE 59th Conference on Decision and Control (CDC), Jeju Island, South Korea, December 2020.
- C4. **X. Luo** and M. M. Zavlanos, “Transfer Planning for Temporal Logic Tasks”, IEEE 58th Conference on Decision and Control (CDC), Nice, France, December 2019, pp. 5306–5311.

## RESEARCH EMPLOYMENT

### Research Assistant

*Duke University*, Durham, NC, U.S.

Aug. 2017 - Dec. 2020

- Zavlanos Lab, Department of Mechanical Engineering and Materials Science
- Developed a sampling-based planning algorithm named TL-RRT\* for the multi-robot temporal logic optimal control synthesis problem.
- Developed an optimal control synthesis algorithm for temporal logic specifications by exploiting experience from solving similar tasks before.
- Developed a hierarchical approach to optimally allocate tasks, captured by global temporal logic specifications, to teams of heterogeneous mobile robots.
- Developed an optimal graph-search method for secure state estimation in large-scale cyber-physical systems modeled as linear time-invariant systems.
- Designed collision-free, dynamically feasible, and socially-aware trajectories for robots operating in environments populated by humans.
- Collaborated on the safety verification problem of a stochastic dynamical system with a ReLU neural network controller.

### Research Assistant

*Harbin Institute of Technology*, Harbin, China

Sep. 2015 - July 2017

- Autonomous Space System Lab, Department of Aerospace Engineering
- Developed a capturing and braking strategy for a Mars probe with finite thrust.
- Designed an autonomous navigation algorithm for a Mars probe using celestial objects and landmarks.

## HONORS & AWARDS

1. **Student Travel Grant** for the IEEE 59th Conference on Decision and Control 2020
2. **Fellowship** of the Department of Mechanical Engineering and Material Science at Duke University 2017
3. **Outstanding Graduate (Gold Medal)** of Harbin Institute of Technology 2015, 2017
4. **The Samsung Scholarship** 2016
5. **Scholarship** of the Summer School at Technion – Israel Institute of Technology 2016
6. **National Scholarship for Encouragement** 2012, 2014
7. **First-Class Peoples Scholarship** 2012–2015

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\*Equal contribution.

**SKILLS**

Programming Languages: Python, Matlab, C/C++, UNIX shell scripting

Tools: ROS, version control systems (Github, Bitbucket), model checking tools (NuSMV, PRISM)